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A61F

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(54) Hip Implant

(57) A hip implant is described comprising a tapered stem portion (2) with a substantially straight linear axis and an integral wedge-shaped portion (4) extending medially from the stem portion at or near the wider end of the stem portion, the wedge-shaped portion being surmounted by a ball head (5), the wedge-shaped portion and an adjacent part of the stem portion having a plurality of ridges or convolutions extending therearound, each ridge or convolution lying in a plane substantially perpendicular to the load bearing axis through the head and wedge-shaped portion when the hip implant is in use in the body.

The ball head may be separable from the wedge shaped portion.

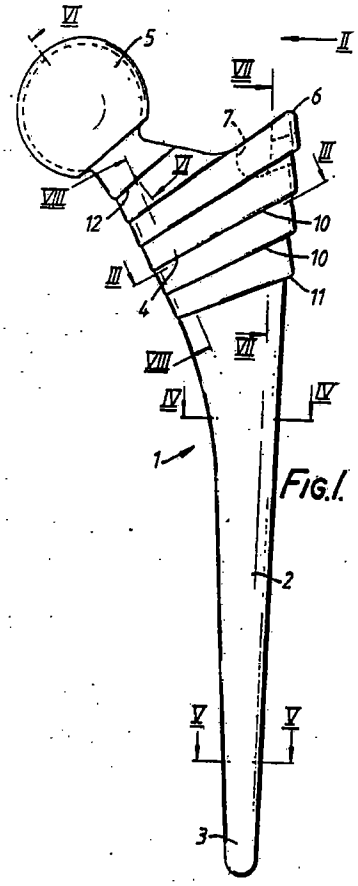

FIG. 1.

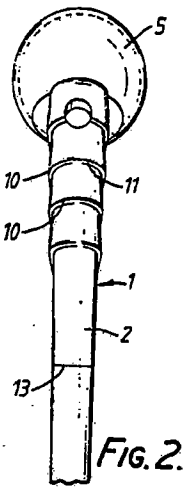

FIG. 2.

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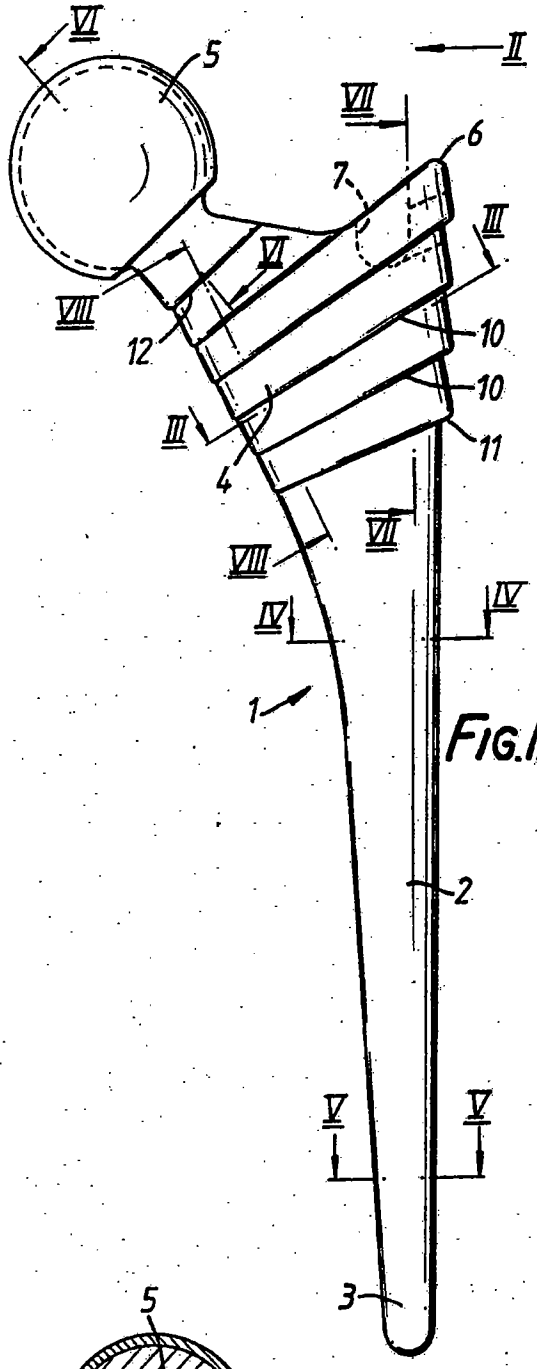


FIG.1.

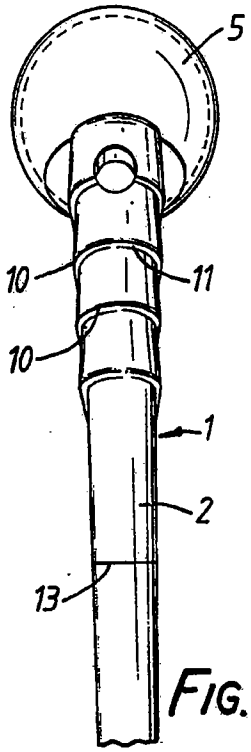
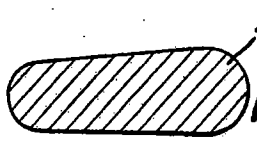


FIG.2.



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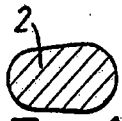

FIG.4.

FIG.5.

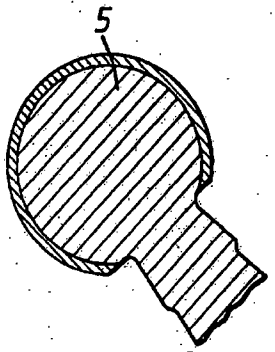

FIG.6.

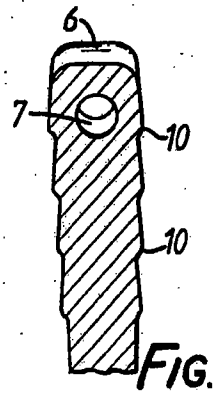

FIG.7.

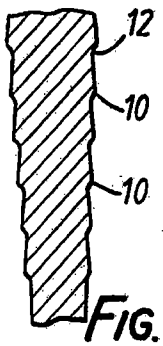

FIG.8.

HIP IMPLANT

This invention relates to an artificial implant for use in a hip replacement operation.

The efficient functioning of the hip joints is extremely important to the well being and mobility of the human body. Each hip joint is constituted by the upper portion of the upper leg bone (femur) which terminates in an offset bony neck surmounted by a ball-headed portion which rotates within a socket (acetabulum) in the hip bone. Diseases, such as rheumatoid- and osteo- arthritis can cause erosion of the cartilage lining the acetabulum so that the ball of the femur and hip bone rub together causing pain and further erosion. Bone erosion causes the bones themselves to attempt to compensate and reshape, thus giving a mis-shapen joint which may well cease to function altogether.

The replacement of the hip joint by an artificial implant is widely practised but the implants conventionally used can suffer from a number of disadvantages.

Thus, conventional hip implants are usually inserted by resecting the neck of the femur and reaming a comparatively large cavity down the femur to receive a bow-shaped implant surmounted by a ball which is then cemented in place using, for example, an acrylic filler material. The implant is bow-shaped to correspond to the angle which the intact femur ball head makes with the downwardly extending stem of the femur. Examples of such hip implants are shown in GB Patent Specifications Nos. 1409053 and 1409054.

The practice of removing almost completely the bony neck of the femur is destructive of bone and against the accepted advantages of conserving as much bone as possible. A further result of the shape of conventional

implants and the removal of much of the bony neck (which in a healthy hip bone provides reinforcement) is the problem of so-called "stress shielding". Thus, with a conventional implant, both compression and torsional loads are being borne by the lower portion of the implant projecting down the stem of the femur and not by the upper bowed portion adjacent the ball. This can lead to fatigue failure of the implant itself and/or undue loading of the adjacent portions of the femur. Because the remaining uppermost portions of the femur are shielded from load they themselves may start to disappear.

The present invention seeks to provide an improved hip implant for use with cement.

According to this invention, we provide a hip implant comprising a tapered stem portion with a substantially linear axis and an integral wedge-shaped portion extending medially from the stem at or near the wider end of the stem, the wedge-shaped portion being surmounted by a ball head, the wedge-shaped portion and adjacent stem portion having a plurality of ridges or convolutions extending therearound, each ridge or convolution lying in a plane substantially perpendicular to the load bearing axis through the head and wedge-shaped portion when the hip implant is in use in the body.

Preferably each ridge defines a substantially flat surface facing the narrower end of the stem. Preferably each ridge, commencing with that ridge against the ball head, lies in a plane which is more nearly horizontal than the preceding plane. The term "substantially perpendicular to the load bearing axis" is intended to encompass this variation. Preferably each ridge projects further from the base surface of the implant than the ridge which is next nearest and towards the narrower end of the stem.

If desired the ball head is separable from the

wedge-shaped portion.

One form of the invention will now be described with reference to the accompanying drawings wherein:

Figure 1 is a side view of a hip implant in accordance with the invention;

Figure 2 is a rear view, partly broken away, in the direction of arrow II of Figure 1; and

Figures 3, 4, 5, 6, 7 and 8 are sections on lines III-III, IV-IV, V-V, VI-VI, VII-VII and VIII-VIII, respectively, of Figure 1.

The implant 1 shown in the drawings is of an acceptable material for introduction to the human body, such as titanium alloy or a cobalt-chromium alloy. It may be all of one material or may have a ball head portion of a different material, such as a ceramic. A convenient way of manufacturing such an implant has been found to be by forging or casting such that the outer contour of the implant is readily formed without additional machining. The implant 1 comprises a stem 2 which has a substantially linear axis. The stem 2 tapers towards its lower end 3, the extent of the taper depending on individual needs. Spaced from the lower end 3, a somewhat flattened wedge portion 4 extends medially and proximally (i.e., in use, towards the middle of and up the body) from the stem 2 and is surmounted by a ball head 5. The stem 2 extends beyond the wedge portion 4 to form a projecting end 6 for lateral support and provided with an aperture 7, which, in use, can receive a hook or like means for removing the implant from the bone if this becomes necessary.

The provision of a separable ball head (not shown) may be used to adjust the neck length for individual needs. Thus ball heads incorporating varying neck lengths can be fitted to standard stems with shortened wedge portions.

The wedge portion 4 and adjacent stem are

provided with a series of ridges 10 extending therearound each in a plane substantially perpendicular to the load bearing axis of the implant in use through the ball head 5 and wedge portion 4. Each ridge 10 defines a surface 11 facing the lower end 3 of the stem. Each ridge 10 projects further from the base surface of the implant on that side of the stem 2 facing away from the wedge-shaped portion 4 so that, for each ridge 10, the surface 11 is wider and flatter in the region of the stem 2 than in the region of the wedge portion 4, as best seen in Figure 1. The lowermost of the ridges 10 lies in a plane which is more nearly horizontal than that of the adjacent higher ridge. An uppermost ridge 12 is also formed on the wedge portion 4 adjacent the head 5. However no distinct collar is formed as is often the case with prior constructions, which collar would be intended to be load bearing and bear against the considerably resected neck of the femur.

The surface of the implant can be modified as desired. Thus it may, for example, be plain, textured or coarse blasted, or coated with an inert metal or other material or certain areas of the implant may be coated with material to give a porous surface. It has been found particularly desirable to texture the upper part of the implant, such as by grit blasting with aluminium oxide, for example, above the line 13 shown in Figure 2 while the lower part of the stem 2 below line 13 is polished.

In use the stem 2 of the implant 1 is loosely inserted in a cavity in a femur formed by reaming and then rasping with an oversize replica stem with sharp teeth. The bony cavity thus formed has corresponding ridges which aids load transfer from the implant through the cement into the bone. Although the ball of the femur has been resected, as much as possible of the bony neck has been retained, the flattened wedge portion 4 seating in a slot in the bony neck. An acrylic cement, compatible with the

human body is injected into the cavity and the implant bedded down. The presence of ridges 10 with downwardly facing surfaces 11 assists in compacting the cement into the cavity to make an efficient seal. The cement is then allowed to set. When the joint is used, the presence of the ridges 10 in the implant assists load bearing in the upper portion of the joint adjacent the neck. Thus little load bearing is done by the lower part of the stem 2. This obviates the problem of stress shielding discussed above. The narrowing of the surfaces 11 in the region of the wedge portion 4 is advisable so as to present a smoother profile in that region to avoid break up of the cement mantle.

CLAIMS

1. A hip implant comprising a tapered stem portion with a substantially straight linear axis and an integral wedge-shaped portion extending medially from the stem portion at or near the wider end of the stem portion, the wedge-shaped portion being surmounted by a ball head, the wedge-shaped portion and an adjacent part of the stem portion having a plurality of ridges or convolutions extending therearound, each ridge or convolution lying in a plane substantially perpendicular to the load bearing axis through the head and wedge-shaped portion when the hip implant is in use in the body.

2. A hip implant according to claim 1, in which each ridge defines a substantially flat surface facing the narrower end of the stem portion.

3. A hip implant according to claim 1 or claim 2, in which each ridge, commencing with the ridge nearest the ball head, lies in a plane which is more nearly perpendicular to the axis of the stem portion than the corresponding plane of the preceding ridge.

4. A hip implant according to any one of claims 1 to 3, in which each ridge projects further from the base surface of the implant than the ridge which is next nearest and towards the narrower end of the stem.

5. A hip implant according to any one of claims 1 to 4, in which the ball head is separable from the wedge shaped portion.

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